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Context-Specific Dynamics of Centrally-Planned Macro Program for School Infrastructure Reform


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Abstract

The educational program evolved at the national level manifests in a general macro program. The school infrastructure development program through the President's Education Reform Program (PERP) is one of the centrally developed educational programs in Nepal, as the case of this research article. The objective of this article is to analyze the context dynamics of centrally evolved school infrastructure (ICT and classroom building) program installation. The primary data employed in this article were drawn from the stakeholders of three program school cases situated in Sarlahi and Rautahat districts belonging to an embedded multiple-case study design of qualitative research methodology. FGD, key informant (KI) interviews, and general observation methods were used for information elicitation. The research findings reveal that centrally developed macro program policy interacts with school system-specific micro-contexts or central policy contexts which make program policy be implemented irrespective of the prioritized need, adapted with a modified technical design responding to the school-specific resources, and practiced with diverse school leadership styles. In the lapses of coordination and commitment of the tiered governance systems, the PERP or any other macro-program policy becomes strange for the implementers. The complex interaction of school-specific systems dynamics consisting of school infrastructural needs, stakeholder involvement, established school leadership styles, and initiation of local government authority make central macro policy be enacted and adapted rather than be linearly implemented. This implies incorporating the school-specific dynamics as a core component of the education plan for the formation of pragmatic program policy to enact effectively.

Keywords: complex systems, program policy, school infrastructure, program implementation, dynamics

Context-Specific Dynamics of Centrally-Planned Macro Program for School Infrastructure Reform

Conceptualizing and developing education programs at the central level with a macro education systemic view is a top-down linear approach, Nepal adopts, for transforming the micro school systems evolved in the local contexts. Transformation is a buzzword (Ahmed, 2010) in today's national and global education policy and programs where education reform is placed at the center of concern (Verger, 2018). In this context, realizing the fundamental requirements for quality school education, the Ministry of Education, Science, and Technology (MOEST), Nepal, has been continuously making efforts to develop different modes of the program towards the transformation of the public school system (Research Center for Education Innovation and Development [CERID], 2007). Among the programs, school infrastructure development is one. Infrastructure is a fundamental aspect of ensuring a child-friendly environment in a school system.

President's Education Reform Program for physical infrastructure and learning facilities of educational institutions was announced by the Government of Nepal (Office of the Prime Minister and Council of Ministers [OPMCM], 2019) and committed to implement through the national policy and program (OMPCM, 2020). The PERP Implementation Procedure informs in its very preamble that the program was conceptualized to contribute to enhancing the quality education of the public schools by ensuring their infrastructure development and reconstruction, improvement of the student learning achievement, laboratory, instructional, and sports materials (Office of the Prime Minister and Council of Ministers [OPMCM], n.d.). The program is undertaken into a set of diverse reform programs i.e. construction of community school building; improvement of students' learning achievements; use of information and communication technology (ICT), innovative pedagogy, and learning materials for quality education; improving access to technical and vocational education; and

management of extracurricular materials (play based materials) and extracurricular teachers in the community schools (OPMCM, n.d.), which intend to respond the needs of local school systems of the country.

The Centre for Education and Human Resource Development (CEHRD) is the macro systemic tier to regulate, implement, and supervise the reform program (OPMCM, n.d.). Through the fiscal years 2020/2021, 2021/2022, and 2022/2023, 7278 schools, 4172 schools, and 3475 schools respectively had benefitted from across the country regardless of the school education structure (Center for Education and Human Resource Development, 2020, 2021, 2022). Despite the diverse areas of school support programs mentioned in the PERP policy, in the latter two fiscal years, the program emphasis was only on two areas: the ICT facility program and the two-room or four-room school building construction program.

Objectives

The objectives of this article are to analyze the interplay of dynamics of the installation of infrastructure development programs in school systems and to identify the effectiveness of the school leadership styles in managing the dynamics of the infrastructure installation.

Literature Foundation

A comprehensive approach to literature review was adopted in the development of fundamental issues to connect policy and practice and identify the present research practice in the periphery of the issue. The theoretical and the empirical literature review have strengthened the study by providing theoretical orientation to and justifying the rationality of the paper respectively.

Theoretical Underpinning

This paper relates the logic model (LM), theory of change, and complex systems theory to interpret the program information. The program logic model which is also known as program theory informs a logical sequence of the

resources, activities, output, and short-term, intermediate, and long-term outcomes (McLaughlin & Jordan, 2015) of the PERP. Though the logic model is a traditional linear theoretical instrument to interpret a program, evaluators or researchers often use this model to link and analyze the program entities like inputs, processes, outputs, and outcomes linearly which reveals the intended and actual position of a program. It can serve as the foundation for making decisions about the program (Fitzpatrick et al., 2011). Theory of change propounded by (United Nations Development Group [UNDG], 2017) is a method that explains how the PERP, an educational program representing a given set of interventions, is expected to lead to specific development change in the school systems, drawing on a causal analysis based on available evidence (United Nations Sustainable Development Group, 2017). This theory is accompanied by school sector programs like SSDP (MoE, 2016) and SESP (Ministry of Education, Science, and Technology [MoEST], 2022), which gives insight to this author to interpret the program impact. The program policy deals with systems theory. Cunningham (2014) states, “All things come embedded in situations, most involving multiple entities in interaction. Multiple entities in interaction can be understood as systems” (p. 13). Therefore, the complex systems theory rejects the notions of the traditional theories viewing infrastructure installation in the school system of the PERP from simple, closed, and linear systems.

Further, the complex systems theory has drawn concentration to analyze the multiple diverse components or factors that interact in multiple diverse ways, producing diverse outcomes that are difficult to predict in advance (Cunningham, 2014; Page, 2011). This theory implies that the school leadership is expected to seek a new paradigm to lead a school program selecting an appropriate model from solo, shared, distributed, system, moral leadership, and blended leadership (Bush, 2019; Bush & Glover, 2014; Coleman, 2011; Crawford, 2012, 2019) to respond complex context.

Empirical Literature Review

Content analysis study made by Egmir et al. (2017) on the educational research trends shorting out 197 research studies consisting of 251 subjects from 35 developed and developing countries found out teaching and learning, teacher education, skills, curriculum, teachers, ICT, scale development, ethics of responsibility, comparative education, nonformal education, employability, and school dropouts themes. Likewise, Ahmad's (2021) study explored school maintenance processes, techniques, frequency and routine of the reparation, and obstacles faced by schools in preparing facility and infrastructure reparation. However, these do not cover the issues related to the infrastructure installation process. Among the rare studies in this field, the study made by Cuesta et al. (2016) with the representation of developed and developing countries shows that the impact of the overall school infrastructure on student learning is positive. Similarly, another study informs that the educational infrastructure supports teacher professional learning and promotes changes in teachers' professional practices and beliefs (Shirrell et al., 2019). Furthermore, the school infrastructure facilitates and guides teachers' sensemaking processes about their instructional practice (Larsson & Löwstedt, 2023). The review shows that the research on the school infrastructure about quality learning of children is yet to be prioritized educational research since it is a fundamental dynamic for a safe, healthy, and conducive learning environment for a quality education.

A school's better physical infrastructure is the prerequisite for meaningful classroom teaching and learning (CERID, 2008). Further, the CERID writes in the research report that efforts to improve school construction and its supervision should be continued, and good lessons, in such efforts be employed in other districts where there are serious problems of physical infrastructures which are hindering the pedagogical practices. The study of school infrastructure conducted by the CERID has shown that the number of schools with facilities like toilets,

drinking water, and a library has gradually increased. The increase in library facilities has been over 20% (CERID, 2009). Another area of study made by the CERID (2009) was the class repeating trend of the school students in Grades 5, 8, and 10. The critical findings available from ERO's assessment of the NASA reports recently published show that there is still a huge mass of students at the underperforming level (Education Review Office [ERO], 2020). In the school performance audit conducted by the ERO in 2019, the physical infrastructural status of the secondary schools of Nepal measured in average percentage was only 51.7% which indicates an ordinary status of the schools (ERO, 2020). In the tiered governance system in federal Nepal, the local governments appear more engaged with school infrastructure development and student enrolment than with enhancing classroom teaching quality (Schaffner et al., 2024). The study justifies the necessity of research for quality infrastructure construction in the community school systems.

Methodology

The pragmatic research paradigm orients this study to construct knowledge compatible with the multiple theories of the theoretical framework using multiple cases, multiple methods, instruments, and data sources of the methodological approach (Mertens, 2010; Morgan, 2014) to respond to the complex, holistic, and practical problem. The study was based on an embedded multiple-case study design of qualitative research methodology (Yin, 2018). It was a program evaluation research. For the study, three program schools, two from Sarlahi and one from Rautahat district, individually representing toilet and drinking water/ICT installation, two-room building construction, and four-room building construction programs of the PERP as cases, were purposively selected.

Research program school cases and participants were selected employing a purposive sampling technique. The selected research participants were 1 headteacher, 2 teachers; 6 students, 6 parents, and 6 school management

committee members from each sample school; 2 local authorities (elected and personnel) of each program school system; and 2 education personnel from each two district Education and Development Coordination Units (EDCUs).

Altogether, 71 research participants were voluntarily involved in the research in the process of generating context-specific and generalized information for coconstructing knowledge about the dynamics of program installation.

Focus Group Discussion (FGD) for the parents, students, and the school management committee members; in-depth interviews for the school headteachers and teachers; and key informant interviews for Education and Development Coordination Unit (EDCU) and local authorities were used to collect information devising the instruments and using video and audio recorder. In this process, 3 FGDs with parents, students, and SMC members in each school and 17 individual in-depth interviews were conducted. Likewise, the infrastructure installation status had been observed.

Results and Discussion

Diversified Practice in Contexts of the Centrally Developed Policy

The stakeholders and implementers with their agencies were found resisting the positivist or objective notion of the policy and deserving to have interpretive analysis with their context-dependent diverse meanings that influence their acts (Yanow, 1995). Though the PERP is a need-based grant support program (OPMCP, n.d.), the program policy is rigorous general program contents, already specified programs, uniform infrastructural design, and same grant support specifications for school systems situated in the diverse socioeconomic context across the country.

In this policy context, the actors in the context have diverse interpretations from the schema formed within the school situated with unlimited needs and problems being perceived. As stated by Spillane et al. (2002), the implementation schema of the monolithic central program policy confronts implementers'

criticism. The actors of the program policy at different systemic levels possess different and complex reactions and responses toward implementation.

Policy Enactment Irrespective of the Prioritized Needs

The schools are seeking grant support for their school-specific prioritized needs. Though the PERP has different categories of support programs, among the program schools, two had to receive support grants irrelevant to their prioritized needs. Talking about the support program, school A, situated in a rural-terai area running with basic level education, was found suffering from numerous infrastructural needs, and was to propose grant support in compliance with the PERP specifications. The headteacher of the school said, "The grant proposals were modified for toilet construction grant support in the first program year and for ICT installation grant in the second year of the program, though the prioritized needs were teaching staff and construction of the school compound wall". Further SMC chair and Headteacher both added, "We are in search of adequate grant support to respond to the infrastructural needs of constructing school compound wall and replacing wrecked buildings." The researcher's observation captured that the expensive Advanced Virtual RISC (AVR) smart board, printer, and desktop computer with an all-in-one system had been kept in the rooms with a weak lock system and wrecked building. On the other hand, like the research findings of Rana et al. (2022), none of the teachers received training in the use of ICT in rural schools and teachers to handle it properly and purposefully. Likewise, this shows a complex and adaptive enactment of the macro program policy into micro practice (Moss, 2012).

A similar practice was found in the program school B also. A secondary school was running in general as well as technical education stream (Electrical Engineering) is running. The headteacher of the school shared:

Additional classrooms were necessary to manage the classes of both streams with huge numbers of students. The pressing need of the school

was the classroom. So, the school dropped the proposal for four-room building construction in the first program year. The school was selected for a building construction grant. Despite this selection, the school was given the ICT installation grant.

This informs that schools exhibit many features of a complex interaction of systems' elements or agents performing macro and micro systemic coevolving relations and results unpredictably. Hence, the school both shapes and adapts to macro- and micro for its self-organizing development (Morrison, 2008). This coevolving system seems to avoid the absolute implementation notion prescribed by the program logical model of linear single cause and effect sequential systemic theory.

In this regard, the headteacher further expressed, "The classroom building was a must, but the authority said the number of school grants ran out. So, take the ICT support program." This shows the macro policy does not respond to the micro school-specific problems or needs adequately.

In the subsequent year, however, the school proposed for classroom construction and got a grant for two-room building construction. However, the building construction process plunged into a disoriented interaction of the school system power dynamics (Burgh & Yorshansky, 2011), insufficiency of the grant provided by the federal government, and lack of coordination of the federal and local governments in terms of conditional grant as per given in the PERP policy (OPMCP, n.d.). The comprehensive or holistic program is expected to respond to the complex problems of such a school system for sustainability of the reform rather than a piecemeal program policy (Wells, 2013) which addresses only one aspect of the complexity.

Adaptive Implementation of Technical Design of Infrastructure

As response shared by the research participants, structurally, the design of building construction had been changed in program school C, a secondary school

situated in an urban municipality. The central policy spelled in President Educational Reform Program Implementation Procedure 2019 and circulated instructions tell the program implementers to construct a one-story four classroom building symbolically recognized as the president's office-initiated educational reform. The researcher got to observe a building being constructed as a four-room two-storey building, which is generally not allowed by the technical prescription of the PERP policy for the construction. Curiously researcher asked the members of the SMC in FGD, "The school has limited space, and not possible to build the four-room two-storey building. So, structural design for a room two-storey building prepared by the Municipality Engineer has been followed instead of the notion of the PERP policy." In the Terai urban areas, the schools have owned limited space for schools.

Headteachers of the school also shared the same thing, "though the federal policy was to build a four-room one-storey building, a two-storey four-room building had been designed by local government engineer and construction was initiated accordingly due to the lack of space in the school compound". The same thing was shared by the municipality Engineer as well in the interview conversation. It shows that the general building design policy of the center level (macro system) does not work exactly as it intends. Rather the policy is interpreted in the local context and adaptively implemented responding to the space available, composition of soil, and landscape for building construction in the area belonging to the school systems and analyzing and projecting the building structure fit-for-future.

Effect of Locally Unaddressed Conditional Grants

The notion of fiscal support for school infrastructural transformation mentioned in the President Educational Reform Program Implementation Procedure 2019 instructs to enact a conditional grant which expects a crucial role of the local government to complete the cycle of construction. Headteachers and

municipality mayors who are key players in implementing the PERP-supported construction are found skeptical about the policy notion of conditional grants. A rural municipality mayor, under whose constituency, the program school A is situated, said, "It (PERP policy) has not been yet included in policy agendas of the municipality. But I commit to allocate budget to complete the construction work of buildings." This reveals linear, discrete, and compartmental policy systems or agents on program implementation.

Nothing is expected to stand alone, everything is naturally interconnected (Kershner & McQuillan, 2016) for dynamism. Unlike this natural system a gap between the national and the local rural municipality policies. The skeptical policy behavior at the local level weakly favors the PERP to establish as a local system dynamic in the complex school systems. Likewise, a research participant representing the Education Section and Information Officer of a Municipality reacted to the PERP policy provision for fiscal collaboration with the local government, "the central government thinks that the local governments have an excessive budget. This is wrong thinking". Referencing the program school B, he further expressed the causes of incomplete infrastructure construction, "the school has been also facing same barriers like the budget insufficiency, locally unrecognized conditional grant of the central policy, and lack of central and local governments' co-ordination on conditional grant mentioned in the PERP implementation policy". The research participant expressed his reservation about the budget allocation of the local government in the context of Terai:

the road construction has been still being prioritized in the local policy, program, and budget which is not necessary in the case of Terai since no places are found in Terai out of the road network. Rather the education and other service sectors should be prioritized in the policy program and budget allocation now.

This hints at rethinking the pattern of the policy, program, and budget allocation analyzing the sector-wise development proportionately and priority basis.

Determinant Role of School Leadership Styles for Program Enactment

The leadership style applied by a school leader matters for the successful implementation of school education reform programs. The leadership styles like solo, shared, distributed, system, moral leadership, and blended (Bush, 2019; Bush & Glover, 2014; Coleman, 2011; Crawford, 2012, 2019) make different degrees of interaction with the program policy. Solo leadership intersects with the technical rationalistic or linear logical systemic model whereas shared, distributed, and blended leadership styles are expected to be complexity-responsive.

In the research process of the infrastructure policy implementation, the foremost concern is the school-based leadership. Leadership is the process that is an integrated functional quality of value, vision, and influence (Bush, 2019). The leadership role performed by the headteacher in the process of the PERP implementation, in terms of infrastructure installation, is “independent of positional authority” (Bush, 2019, p. 4) and adaptive leadership responding to the complex school context.

In this way, leadership is “whereby intentional influence is exerted over other people to guide, structure, and facilitate activities and relationships in a group or organization” (Yukl, 2010, p. 21). Among the three program schools, program schools A and B were found practicing a shared leadership style by the school headteachers in which there are patterns of interactive leading–following relationships developing cohesive group-level leadership structure, they can also change such that who is leading at one point in time might be following at a different point in time (DeRue, 2011) and or in issue. The shared role of leader and follower is a complex adaptive process (DeRue, 2011) that evolved through the role played by the involved stakeholder actors representing power systems to

respond to the needs for the school infrastructure under a shared common vision. Through the research, it is found that distributing authority via networks stimulates the emergence of shared leadership (Kershner & McQuillan, 2016) that characterizes a dynamic, energetic, and accountable performance; and possesses a team excitement on work accomplishment, spirit, and perfection of the four-room building construction.

On the other hand, solo leadership led by a headteacher with formal positional authority ignoring the power relation and their interaction is likely incompatible with responding to the complex and dynamic school system. The performance of this leadership for installing the two-room building construction program of the PERP was found clumsy, slack, criticized, and incomplete work. This shows that the shared leadership is a collective leadership which is a better program enactment instrument than the solo leadership measure.

Adaptive Installation of Infrastructure Program

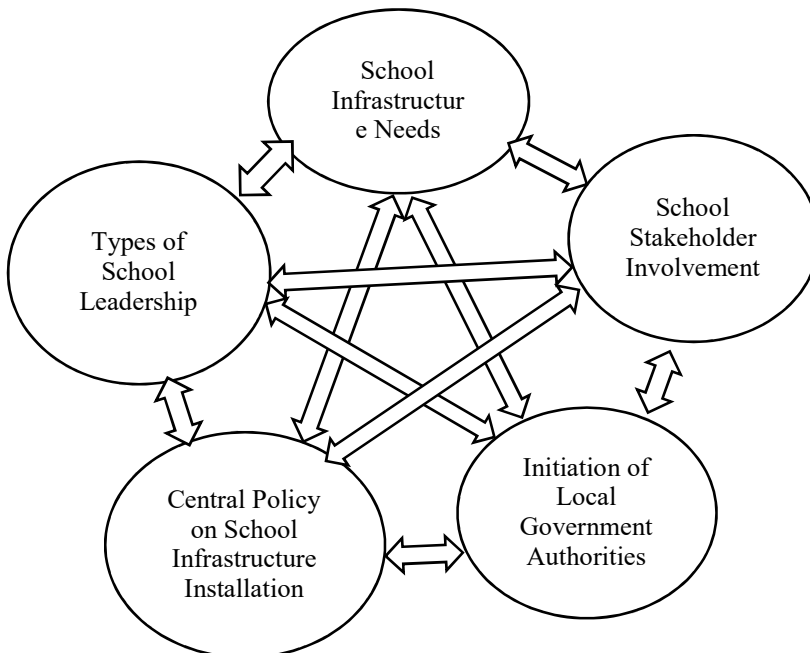
The central program policy of the PERP is a major dynamic that has confronted complex dynamics in the implementing school contexts. Like in stated by Honig (2006), this implementation research found policy, people, and place as the dynamic dimensions that interact with each other while the PERP implementation has taken place in the school contexts. The policy goals, targets, and tools of the program are general and, monolithic directions in the concept used by Spillane (1998); people representing formally named or unnamed, a subgroup within formal targeted, policy maker, policy implementer, communities and other association; and places like focal organization, historical and institutional contexts, and cross-section system interdependencies (Honig, 2006) are for Spillane (1998) nonmonolithic systems. To mitigate the macro objective reality in policy and micro nonnomothetic school context reality, an implicit mutually adaptive policy evolves through the interaction of top-down policy enforcement and bottom-up policy anticipation which is mediated through people

(actors). That is, centrally set policies are modified in formal and informal ways to reconcile macro-level demands with micro-level realities (Sultana, 2008).

In the process of program policy implementation in the school context, systemic units at the local level are school administration, school management committee, education, and development coordination unit, social auditing committee, education section of local government, and local government which have explicitly defined legitimate role and responsibility to understand the school needs, to influence policy enactment of school construction, to involve in activities, and to orient the other people. These dynamics are categorically sated as central policy on infrastructure installation, school need, stakeholder involvement, school leadership, and local government authority, given in Fig 1. These school system dynamics revealed in behavior by human actors with authenticity for enacting a policy of the school building construction program are crucial.

Figure 1

Systems Dynamics of School Infrastructure Installation.



In the case of program school B, the dynamics of the system were disoriented, uncoordinated, and fragmented in terms of the policy enactment of school classroom building construction. As a result, the construction program is waiting for further system decisions to address the incomplete work. In the case of the other two program schools, the infrastructure installation program is being carried out in a coordinated, speedy, without dispute, and goal-oriented manner of the dynamics.

Conclusion

The PERP, a macro program policy logic, intends to have coordination among the tiers (federal, provincial, and local governance) of the federal government system for its implementation. In the program policy, the conditional grant provision is a key issue yet to be recognized by the local government through its policy and program to bring it into practice, though it is a pragmatic policy perspective. The provision seeks a shared fiscal responsibility in the school reform program. To respond to the context of this complex system, the infrastructure reform programs are found adaptively installed in the diverse school systems. The classroom building construction in the observed program schools is found far to have completion of their construction due to the incomplete grant and lack of policy program intervention of the local governments. The construction programs addressing the prioritized needs and managed by a shared leadership style can accelerate. Similarly, the ICT grant support has proven to be useful in the scarcity of teachers and for student motivation in the basic school; and for the technical education students and teachers for technology-based teaching and learning. However, there is uncertainty about the security and sustainability of the ICT facilities and devices installed in the rural basic schools with no compound wall and run with poor physical infrastructure. Similarly, the cost-effectiveness and proper use of the ICT-CCTV camera (which was not functioning) and expensive smart board installed in the school are matters of criticism. These

happen if the support program is not as proposed grant support based on the prioritized needs of the school. These types of programs are also found to be technically unintended support programs. This reality shatters the linear notions of program logic. The complex interaction of dynamics is an unavoidable system phenomenon.

Policy, people, and place are the dynamic dimensions for an infrastructure program installation in the school systems. These are general dimensions that comprise specific, active, and functional dynamics like school infrastructure, involvement of stakeholders, initiation of local government authorities, central policy on school infrastructure installation, and type of school leadership style. The macro policy like the PERP with the intent to transform the school infrastructure confronts functional dynamics at the micro level incomplete nature in the ground realities of the schools. Human factors as actors to manage and reorient the dynamics which is addressed with school leadership style.

Implications

The research findings suggest that infrastructure program policy needs to reflect the complex dynamics in the community school systems. The findings also imply the need for reconceptualizing the traditional monolithic macro program policy and developing policy responding to the school with diversified dynamics of program implementation. This also informs that the existing trend of policy-practice research seems likely unable to explore the complex interplay of the dynamics in the process of infrastructure program installation in school systems. Hence, this article implies school infrastructure installation research is a new dimension in the field of implementation research study.

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